

# Demand Estimates and Projections

This chapter describes two types of water demands, gross and net demands. Gross demands, or water withdrawal demands, are the demands on the water resource required to meet a particular need of a water user or customer in an average year. Gross demands, calculated in million gallons per day (MGD), include the system losses from irrigation methods and water treatment processes used in delivering the water to end users.

Net demands, also calculated in MGD, directly meet the needs of end users or customers after accounting for treatment and process losses, and inefficiencies. In terms of Public Water Supply, these demands are commonly called “finished water demands.” For the 20-year planning horizon of 2010 to 2030 in the *2011 Lower West Coast Water Supply Plan Update* (2011 LWC Plan Update), net demands must be met by the proposed selection of sources, treatment processes, storage options, and reclaimed water use resulting from the Public Water Supply projects identified in **Chapter 6**.

This chapter provides an overall perspective of the gross and net demands in terms of average weather conditions and associated growth in the Lower West Coast Planning Area (LWC Planning Area) through 2030. Water use permit criteria requires allocations to meet 1-in-10 year drought conditions. Gross and net demands for 1-in-10 year drought conditions are estimated and projected in **Appendix A**. Demand projections in the *2005–2006 Lower West Coast Water Supply Plan Update* (2005–2006 LWC Plan Update) were determined using 2000 baseline data (Appendix D), and demand projections in that plan update’s Chapter 2 reflected the 20-year planning horizon of 2005 to 2025.

## LAW / CODE

A 1-in-10 year drought event is an event that results in an increase in water demand to a magnitude that would have a 10 percent probability of exceeding during any given year. Subsection 373.0361(2)(a), Florida Statutes (F.S.), states the level of certainty planning goal associated with identifying demands shall be based on meeting demands during a 1-in-10 year drought event.

## NAVIGATE

**Appendix A** provides a full description of the methods used to estimate water use for each major use category and includes estimates of both the customer demands discussed here and the raw water withdrawals, which would result from implementation of the projects discussed in **Chapter 6**.

For the 2011 LWC Plan Update, a new baseline incorporating 2005 data was established to estimate demand projections. The 2005 baseline was developed from extensive data including population, land use, crop production, irrigation systems, historical water use, and climatic conditions. Data from 2005 were also used to develop water use factors, such as finished-water per capita rates by utility and irrigation system efficiency by crop type. These factors, along with projected variables such as population and irrigated acres, were used to project future water demands for this plan update's 20-year planning horizon of 2010 to 2030.

**Appendix A** provides both gross and net water demand projections for average-year and 1-in-10 year drought conditions, as well as additional information about water demand within each water use category from the 2005 baseline to 2030. In the case of agriculture, acreage and demands by crop type are included, and in the case of public water supplies, population and demands by utility are provided. Although not quantified in this chapter, environmental demands are addressed during the water supply planning process using resource protection criteria.

## DESCRIPTIONS OF WATER USE CATEGORIES

Gross and net water demands for 2005 and projections through 2030 are estimated in five-year increments for each of the six water supply categories (**Appendix A**):

- ◆ **Agriculture Self-Supply:** Water used for commercial crop irrigation, livestock watering, and aquaculture.
- ◆ **Public Water Supply:** Water supplied by water treatment facilities for potable use (drinking quality) with projected average pumpages for 2030 greater than 0.1 MGD.
- ◆ **Domestic Self-Supply:** Water used by households served by small utilities (less than 0.1 MGD) and/or private wells.
- ◆ **Recreation/Landscape Self-Supply:** Water used for irrigation of golf courses, parks, cemeteries, and other self-supplied irrigation uses with demands greater than 0.1 MGD.
- ◆ **Commercial and Industrial Self-Supply:** Self-supplied water consumed by business operations greater than 0.1 MGD.
- ◆ **Power Generation Self-Supply:** Water consumed by power plants in the production of electricity, excluding use of saline water sources.


Urban demands are the combined total of Public Water Supply, Domestic Self-Supply, Recreation/Landscape Self-Supply, Commercial and Industrial Self-Supply, and Power Generation Self-Supply. These use categories are expected to account for 54 percent of the LWC Planning Area's total net demands by 2030. Public Water Supply net demands are expected to increase by 62 MGD, or 47 percent, by 2030, at which time this category will represent approximately 24 percent of the region's total net water demands.

The combined net demands of Public Water Supply and Recreation/Landscape Self-Supply are expected to increase by more than 45 percent by 2030.

The following Gross Water Demands section discusses the average-year gross demand projections for Agriculture Self-Supply, Recreation/Landscape Self-Supply, Commercial and Industrial Self-Supply, and Power Generation Self-Supply. The Net Water Demands section discusses the average-year net demand projections for Public Water Supply and Domestic Self-Supply. Water Supply Development projects proposed for water treatment facilities can be found in **Chapter 6**.

## GROSS WATER DEMANDS

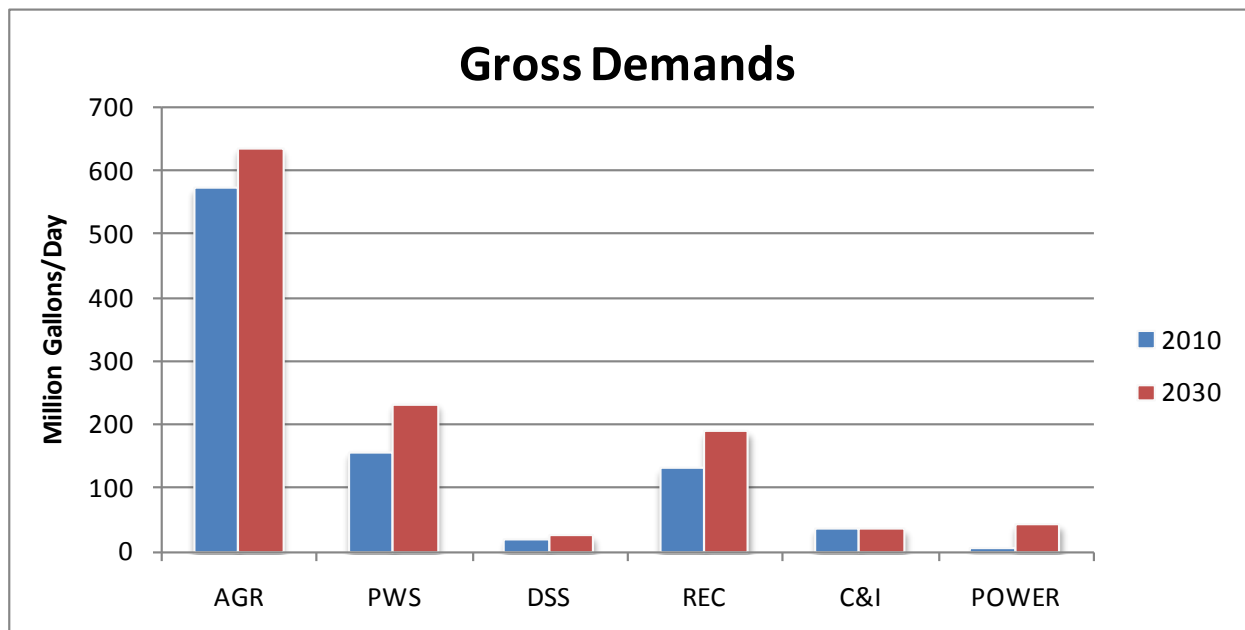
Gross demands differ from net demands for Public Water Supply, Recreation/Landscape Self-Supply, and Agriculture Self-Supply uses due to inefficiencies in delivery or treatment. Not all the water withdrawn is available to meet the net demands; however, the difference between gross and net demands can be reduced through water conservation practices that in turn can reduce demands on the water resource. **Figure 1** shows the estimated 2010 gross demands and projected 2030 gross demands for all water use categories.

**DISTRICT** 

**Gross Demand or Withdrawal Demand:** The amount of water withdrawn from the groundwater or surface water system to meet a particular need. Gross demands are nearly always higher than Net Demands because of inherent treatment and process losses, and inefficiencies associated with delivering water from the source to the end user.

In 2010, gross water demands for all categories in the LWC Planning Area are estimated to total 912 MGD, compared with the projected total of 1,152 MGD by 2030, an increase of 26 percent (**Figure 1**). Key highlights include:

- Agriculture Self-Supply gross demands in the LWC Planning Area are projected to increase by 11 percent, from an estimated 571 MGD in 2010 to 632 MGD by 2030, accounting for 55 percent of the region's raw water withdrawal demands.
- Public Water Supply gross demands are projected to increase by 48 percent, from an estimated 156 MGD in 2010 to 231 MGD by 2030, representing 20 percent of the region's total gross demands (see Net Water Demands section for more information about Public Water Supply demands).
- Recreation/Landscape Self-Supply is expected to increase from an estimated 130 MGD in 2010 to 187 MGD by 2030, a gain of 44 percent.
- Power Generation Self-Supply may rise sharply, from less than 1 MGD in 2010 to 42 MGD by 2030, an increase of 8,320 percent, due to new generation facilities planned by Florida Power & Light (FPL).



	Agriculture Self-Supply	Public Water Supply	Domestic Self-Supply	Recreation/ Landscape Self-Supply	Commercial & Industrial Self-Supply	Power Generation Self-Supply	Total
Estimated 2010 MGD	571	156	19	130	35	1	912
Projected 2030 MGD	632	231	24	187	35	42	1,152
% Change	11%	48%	27%	44%	0%	8,320% <sup>a</sup>	26%

**Figure 1.** Estimated average-year gross demands by water use category. The bar chart compares demands by use category in million gallons per day (MGD), and the table shows the percentage of growth in each use category.

- a. Proposed expansion of three FPL Fort Myers power plants. Percent increase does not include the current total demand, which is for the most part met from a non-permitted seawater source. The future demands are assumed to be met with a permitted source, consequently, the percent increase is artificially high.

## Agriculture Self-Supply

Agricultural acreage in the LWC Planning Area is expected to increase by about 26,000 acres between 2010 and 2030, with local declines in cultivated acreage in Hendry County and increases in Charlotte and Glades counties. The estimated total acreage for 2010 is 306,000 acres, which is projected to increase to 332,000 acres by 2030.

In terms of gross demands, the estimated use of 571 MGD in 2010 is projected to increase to 632 MGD by 2030. At this time, agriculture is projected to account for 55 percent of the region's total gross demands, making it the largest user of raw water.

Agricultural water demand reflects projected irrigated acreage, crop and soil types, growing seasons, and irrigation system types and strategies. Agricultural Self-Supply demand calculations for the 2011 LWC Plan Update were made using the Agricultural Field Scale Irrigation Requirement Simulation (AFSIRS) Model. The model calculates average and 1-in-10 year drought demands using 30 years of daily rainfall and evaporation records. Acreage projections are based on the data and methods contained in the land use projection analysis completed by the SFWMD to support the 2011 LWC Plan Update and the Southwest Florida Feasibility Study (SWFFS). Agricultural acreage estimates from the U.S. Department of Agriculture (USDA) and the SFWMD Water Use Information System have also been used to confirm or revise previous analyses. In addition, representatives of the agricultural community and agricultural stakeholders provided input on agricultural acreage estimates, which were considered in the overall analysis.

This chapter also presents the gross irrigation demands for agriculture (**Figure 1**), as well as the net irrigation demands (**Figure 2**). Gross irrigation requirements reflect the efficiency of water delivery. Net demands reflect an estimate of the amount of water farmers need to place into the root zone of crops. **Appendix A** presents both net and gross irrigation demands by crop type under average-year and 1-in-10 drought conditions from the 2005 baseline through 2030.

## Recreation/Landscape Self-Supply

Gross demand for Recreation/Landscape Self-Supply is projected to exceed 187 MGD by 2030, a 44 percent increase over the estimated 130 MGD in 2010. Recreation/Landscape Self-Supply use projections primarily include water demands for irrigating golf courses, parks (large and small), cemeteries, community common areas, playing fields, and other uses identified through water use permits and the SFWMD Water Use Information System. The increase in irrigation demands is almost exclusively from landscapes not associated with golf courses. The projected increase in golf course acreage is only about 2 percent over the next 20 years. The estimated and projected gross demands are calculated using the AFSIRS Model. Land use data from the SFWMD's geographic information system (GIS), the SWFFS, golf course publications and personnel, and local planning officials were used to determine golf course acreage and permitted landscape irrigation acres for the 2005 baseline. The future acreage projections for permitted irrigation were based on population growth rates calculated for each county (**Appendix A**).

## Commercial and Industrial Self-Supply

Commercial and Industrial Self-Supply demands are based on 2005 water uses reported in the SFWMD Water Use Information System. Because this demand category is a composite of different use types and historical water use data do not demonstrate clear trends, the demands are held constant through the projection period. The major industrial use is lime rock production, which was at a peak in 2005 and 2006. Gross and net demands are not distinguished for this use category, as most of the water withdrawn is recycled. The demands are projected not to exceed the 2005 demands. Citrus and sugar processing are

other industrial water uses that strive to maintain consistent production that in turn results in consistent annual water use. Due to the uncertainty of multiple market forces in the processing industry, a constant demand is assumed for the 20-year period.

## Power Generation Self-Supply

The need for additional power supplies is expected to grow as the population in the LWC Planning Area and other portions of south Florida grow (**Table 1**). The major power supplier, FPL, expects that much of the additional generating capacity to be installed will use fresh or brackish water sources and cooling tower technology as a heat rejection method. To date, most of the generating capacity has used flow through cooling, and much of this water has been saline water, the use of which is not covered by the water supply plans.

Florida Power & Light expects to add more power generation facilities to its south Florida grid, and three expansion phases are planned. If all three phases occur at the Fort Myers Power Plant, power generation demands are projected to increase from less than 1 MGD in 2010 to 42 MGD by 2030 (**Figures 1 and 2**). These projections represent the water needed to support all power-generating capacity increases in the LWC Planning Area.

## NET WATER DEMANDS

### Population and Water Use Trends

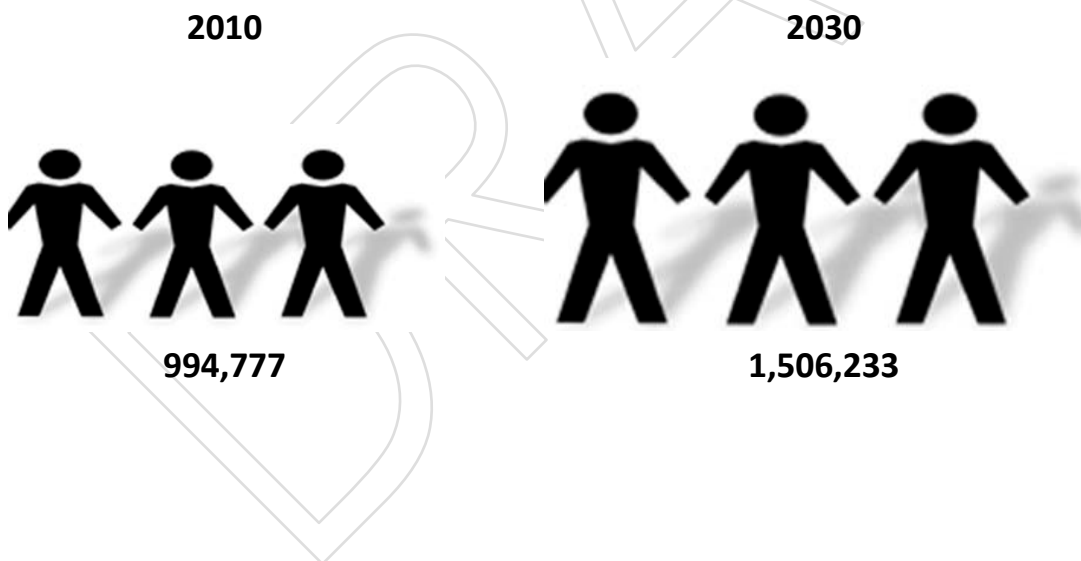
The LWC Planning Area's population is projected to increase by 51 percent from 2010 to 2030, with Collier and Lee counties attracting the greatest number of new residents. **Table 1** provides a summary of the population estimates for the counties or portions of counties located in the LWC Planning Area. The distribution of population within individual utilities is based on historical data and projected distributions of population in traffic analysis zones and utility service areas. **Figure 2** provides a summary of the projected net water demands under average-year conditions between 2010 and 2030 for all water supply use categories.

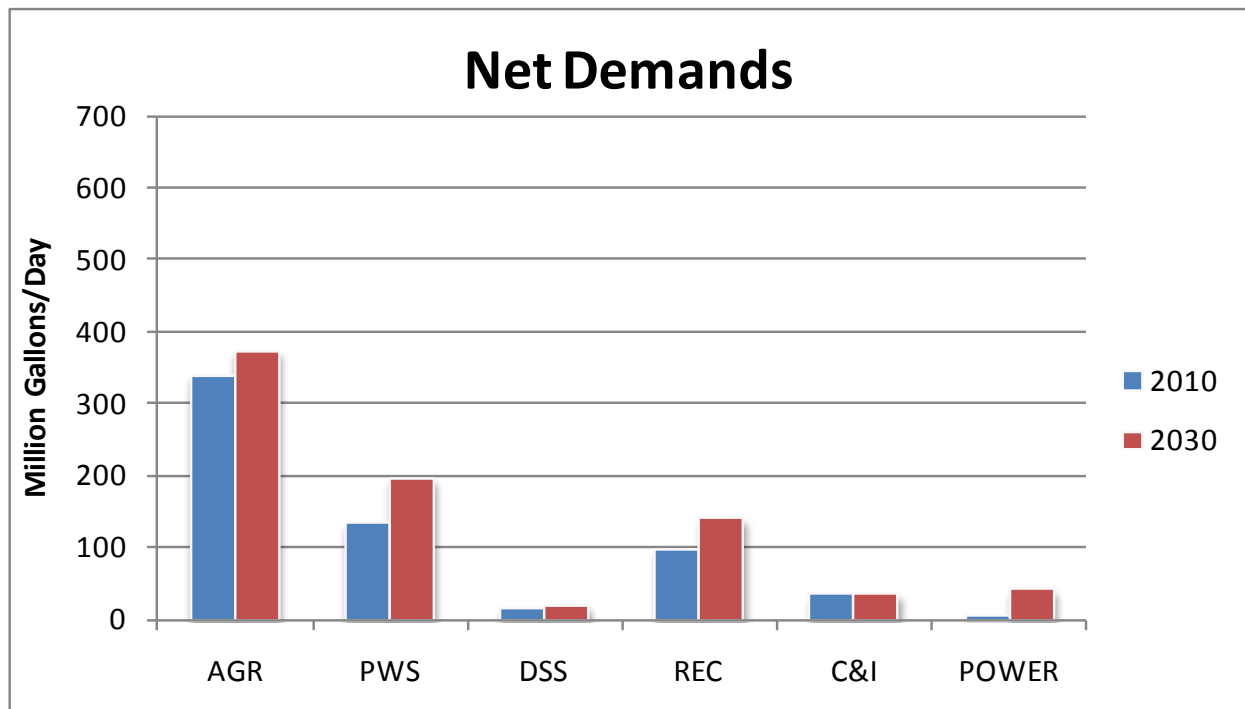
**Table 1.** Population in the LWC Planning Area, 2010–2030.

County Area	2010			2030		
	Projected Population <sup>a</sup>	Public Water Supply	Domestic Self-Supply	Projected Population	Public Water Supply	Domestic Self-Supply
Collier	341,565	310,952	30,613	471,999	410,126	61,873
Lee	606,950	542,433	64,517	957,100	917,012	40,088
Hendry (Portion in LWC Planning Area) <sup>b</sup>	38,943	25,729	13,214	52,473	30,243	22,230
Glades (Portion in LWC Planning Area) <sup>b</sup>	7,253	3,697	3,556	10,495	5,858	4,637
Charlotte (Portion in SFWMD) <sup>b</sup>	66	0	66	14,166	13,948	218
<b>LWC Total</b>	<b>994,777</b>	<b>882,811</b>	<b>111,966</b>	<b>1,506,233</b>	<b>1,377,187</b>	<b>129,046</b>

a. University of Florida, Bureau Economic and Business Research, 2009.

b. U.S. Bureau of the Census, 2001; University of Florida, Bureau of Economic and Business Research, 2009.





	Agriculture Self-Supply	Public Water Supply	Domestic Self-Supply	Recreation/ Landscape Self-Supply	Commercial & Industrial Self-Supply	Power Generation Self-Supply	Total
Estimated 2010 MGD	339	133	16	97	35	1	621
Projected 2030 MGD	372	195	20	140	35	42	805
% Change	10%	47%	26%	44%	0%	8,320% <sup>a</sup>	30%

**Figure 2.** Estimated average-year net demands by water use category. The bar chart compares demands by use category in MGD, and the table shows the percentage of growth in each user category.

- a. Proposed expansion of three FPL Fort Myers power plants. Percent increase does not include the current total demand, which is for the most part met from a non-permitted seawater source. The future demands are assumed to be met with a permitted source, consequently, the percent increase is artificially high.



## Public Water Supply and Domestic Self-Supply

Population estimates for the LWC Planning Area include permanent populations of Collier and Lee counties and portions of Hendry, Glades, and Charlotte counties. In the county or county portion located in the LWC Planning Area, population growth over the next 20 years is projected to increase from an estimated 994,777 in 2010 to more than 1.5 million by 2030. Although the SFWMD portion of Charlotte County is expected to experience the highest increase

(213 percent), primarily due to growth in the Town and Country Utility service area (Babcock Ranch), the population gain is only projected to be 14,000 people. In comparison, Lee County, which is wholly contained in the LWC Planning Area, is projected to post a population gain of 58 percent, or 350,000 people.

Public Water Supply customer demands grow significantly through the projection period because of the associated population growth (**Figure 2**). Domestic Self-Supply demand growth is less significant as most new potable water demand is planned to be met by the larger public water systems.

The permanent resident populations used in this update are consistent with the 2005 medium population projections from the University of Florida, Bureau of Economic and Business Research (BEBR 2009), which provide the baseline for the population estimates in this plan update. Medium BEBR population projections are used to project the estimated 2010 and 2030 populations for each county. A compound annual growth rate is used to distribute the projected population between 2005 and 2030 in five-year intervals for each utility service area.

Traffic analysis zones are used to distribute the 2005 estimated and projected populations into utility service areas within each county or portion of the county in the LWC Planning Area. Traffic analysis zones, which are based on 2000 U.S. Census data, are defined by the Florida Department of Transportation and local metropolitan planning organizations. Areas not served by a utility with a greater than 0.1 MGD treatment capacity are categorized as Domestic Self-Supply. Estimated Public Water Supply water use is based on 2005 finished-water per capita use rates, which are calculated using utility treatment plant production reports and permanent medium BEBR population estimates for each utility. These estimates determine a per capita rate that includes seasonal residents and tourists, as well as commercial and industrial users that are not self-supplied. This approach produces higher per capita rates for utilities with large seasonal population than other approaches used to calculate population estimates. Projected demands for each utility service area have an assumed constant per capita rate for the 20-year period. The Domestic Self-Supply projections are based on a countywide average per capita rate from the utilities.

### DISTRICT

#### **Net Demand or User/Customer Demand:**

The water demands of the end user after accounting for treatment and process losses, and inefficiencies. When discussing Public Water Supply, the term “finished water demand” is commonly used.

Conservation measures were not factored into the demand projections used in this chapter. Rather, conservation is considered a water source option (see **Chapter 4**).

This plan update does not include any future growth plans or proposals that have not progressed to the point where alternatives to the medium BEBR population projections for counties have been approved.

## DEMAND PROJECTIONS IN PERSPECTIVE

The demand projections presented in the 2011 LWC Plan Update are based on the best information available at this time. However, these projections reflect trends, circumstances, and industry intentions that change over time. For example, this plan update expects slower population growth than anticipated in the 2005–2006 LWC Plan Update. However, the growth is large enough that accommodating this population will require infill and development of existing urban areas, as well as development outside of current urban service boundaries. The location of new development and the extent to which it may include historically rural portions of the LWC Planning Area, especially in Charlotte, Glades, and Hendry counties, are important issues. The District will continue to work closely with local governments and their 10-year Water Supply Facilities Work Plans to monitor growth decisions in these areas.

Agricultural land use projections are also uncertain because 1) agriculture is highly dependent on global market conditions, and 2) agriculture is subject to real estate pressures from urban development and ecosystem restoration efforts. Furthermore, factors such as citrus canker and greening may continue to affect the future of agriculture within the planning area. Potential land use changes associated with the proposed River of Grass land acquisition have not been included due to the uncertainty of the purchase itself, and the uncertainty of the area, crop types, and timing of potential changes.

In summary, the major driving force behind the significant growth in water demands reflected in the 2011 LWC Plan Update is the region's anticipated population growth. Most of this growth, in absolute terms, is expected to take place in Lee and Collier counties.

The LWC Planning Area's projected population growth of about 511,000 residents for the 20-year period from 2010 to 2030 is about 163,000 residents less than the growth projection of 674,000 residents from 2005 to 2025 in the 2005–2006 LWC Plan Update. The net result is that the 20-year growth in urban gross demands (all use categories except agriculture) in this plan update is 190 MGD, compared with 212 MGD in the previous plan update.

Average gross agricultural demands are projected to increase from an estimated 571 MGD in 2010 to 632 MGD by 2030, an increase of 61 MGD. This is 97 MGD less than the projected average gross demand for the 2005 to 2025 timeframe in the previous plan update.

Analyses, strategies, options, and development projects to meet these water demand estimates and projections are described in the following chapters.

## REFERENCES CITED

Bureau of Economics and Business Research. 2009. *Florida Population Studies, 2008–2035*. Volume 42, Bulletin 153. BEBR, University of Florida, Gainesville, FL.

United States Bureau of Census. 2001. *Florida 2000 Census of Population and Housing*. U.S. Department of Commerce, Washington, D.C. Available from: <http://www.census.gov/>

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